



Designation: D 6254/D 6254M – 99

Standard Specification for Wirebound Pallet-Type Wood Boxes¹

This standard is issued under the fixed designation D 6254/D 6254M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers the fabrication of new fully enclosed wirebound pallet-type wooden boxes intended for use as containers for domestic and overseas shipment of general materials and supplies, not exceeding 2500 lb [1134 kg] (see 10.1).

1.2 Wirebound pallet-type wooden box performance is dependent on its fabricated components; therefore, a variety of types, classes, and treatments reflecting varied performance are specified. This specification, however, does not cover wirebound pallet-type wooden box performance under all atmosphere, handling, shipping, and storage conditions.

1.3 If the use of other construction methods or techniques is acceptable and permitted (see 5.1.11), the resulting packaging systems shall be of equal or better performance than would result from the use of these specified materials and procedures. The appropriate distribution cycle provided in Practice D 4169 can be used to develop comparative procedures and criteria.

1.4 The values stated in either inch-pound or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the standard. See IEEE/ASTM SI 10 for conversion of units.

1.5 *This standard does not purport to address all of the safety concerns, if any associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 996 Terminology of Packaging and Distribution Environments²

D 1990 Practice for Establishing Allowable Properties for

Visually-Graded Dimension, Lumber from In-Grade Tests of Full-Size Specimens³

D 3951 Practice for Commercial Packaging²

D 3953 Specification for Strapping, Flat Steel and Seals²

D 4169 Practice for Performance Testing of Shipping Containers and Systems²

D 4442 Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials³

D 4444 Test Methods for Use and Calibration of Hand-Held Moisture Meters³

D 6199 Practice for Quality of Wood Members of Containers and Pallets²

F 1667 Specification for Driven Fasteners, Nails, Spikes, and Staples⁴

IEEE/ASTM SI 10 Standard for Use of the International System of Units (SI): The Modern Metric System⁵

2.2 Federal Specifications:

TT-W-572 Wood Preservative: Water-Repellent⁶

2.3 Code of Federal Regulations:

CFR Parts 107–180, Title 49, Hazardous Materials Regulations⁷

2.4 APA—The Engineered Wood Association Standard:

PSI-95 Construction and Industrial Plywood⁸

2.5 *Hardwood Plywood and Veneer Association Standard:*
HPVA HP-1-1994 Hardwood and Decorative Plywood⁹

2.6 National Motor Freight Traffic Association:

National Motor Freight Classification¹⁰

2.7 Uniform Classification Committee Standard:

Uniform Freight Classification¹¹

¹ This specification is under the jurisdiction of ASTM Committee D-10 on Packaging and is the direct responsibility of Subcommittee D10.26 on Wooden Crates, Pallets and Skids.

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² *Annual Book of ASTM Standards*, Vol 15.09.

³ *Annual Book of ASTM Standards*, Vol 04.10.

⁴ *Annual Book of ASTM Standards*, Vol 15.08.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.

⁶ Available from the Federal Supply Service Bureau, Specification Section, Suite 8100, 480 L'Enfant Plaza, SW, Washington, DC 20408.

⁷ Available from the Superintendent of Documents, U.S. Government Printing Office, Mail Stop: SSOP, Washington, DC 20402–9328.

⁸ Available from APA—The Engineered Wood Association, 7011 South 19th St., PO Box 11700, Tacoma, WA 98411-0700.

⁹ Available from Hardwood Plywood and Veneer Association, PO Box 2789, Reston, VA 2290-0789.

¹⁰ Available from National Motor Freight Traffic Association, American Trucking Associations, 2200 Mill Road, Alexandria, VA 22314.

¹¹ Available from the Uniform Classification Committee, Tariff Publishing Officer, 151 Ellis St., N.E. Suite 200, Atlanta, GA 30335.

3. Terminology

3.1 *Definitions*—General definitions for packaging and distribution environments are found in Terminology D 996.

4. Classification

4.1 *Type*:

4.1.1 *Type I*—Sheathed lumber, 2500-lb [1134-kg] maximum load (see Fig. 1).

4.1.2 *Type II*—Sheathed lumber and veneer, 1500-lb [680-kg] maximum load (see Fig. 2).

4.1.3 *Type III*—Sheathed lumber and veneer with two different length sidewalls, 1500-lb [680-kg] maximum load (see Fig. 3).

4.1.4 *Type IV*—Sheathed plywood, 2500-lb [1134-kg] maximum load (see Fig. 4).

4.2 *Class*:

4.2.1 *Class 1*—Partial four-way entry base (see Fig. 5).

4.2.2 *Class 2*—Two-way entry base (see Fig. 5).

4.2.3 *Class 3*—Partial four-way entry base with two different length sidewalls (see Fig. 6).

4.2.4 *Class 4*—Two-way entry base with two different length sidewalls (see Fig. 6).

4.3 *Treatment*:

4.3.1 *Treatment A*—With water preservative treatment (see 6.1.1.9).

4.3.2 *Treatment B*—With water preservative treatment (see 6.1.1.9).

4.3.3 *Treatment C*—Without preservative treatment.

5. Ordering Information

5.1 Purchasers should select the preferred permitted options and include the following information in procurement documents:

5.1.1 Specification title, number, and date.

5.1.2 Box type, class, and treatment required (see 4.1-4.3 and 7.1).

5.1.3 Contents weight.

5.1.4 Modifications to container manufacturer’s identification (see 7.6).

5.1.5 Box dimensions specified in order of length by width by depth (see 7.7 and Fig. 7).

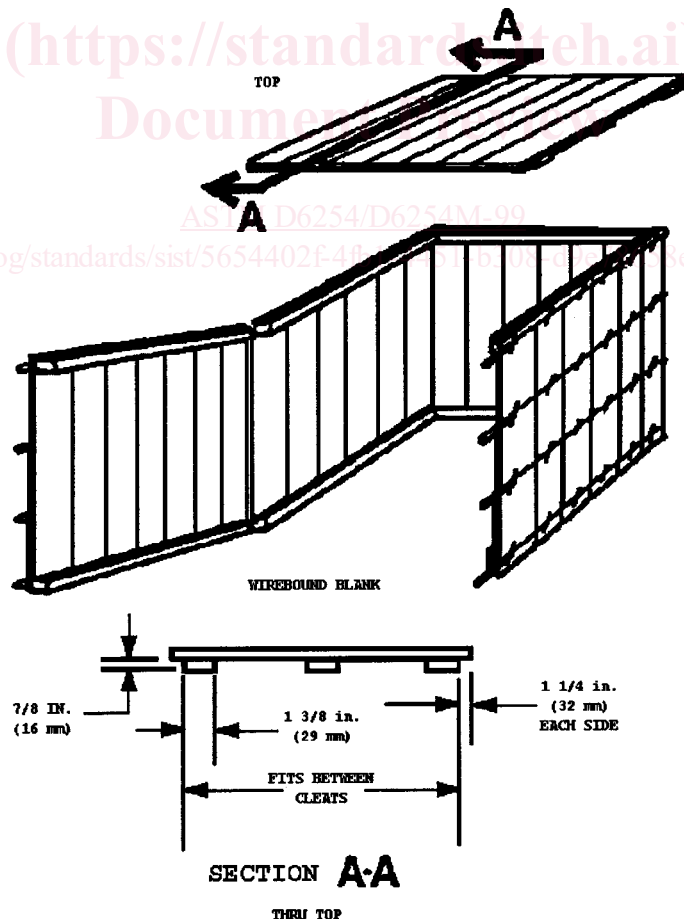
5.1.6 When preservative treatment is required (see 4.3 and 6.1.1.9).

5.1.7 Whether boxes are to be shipped assembled or knocked down (see 9.1).

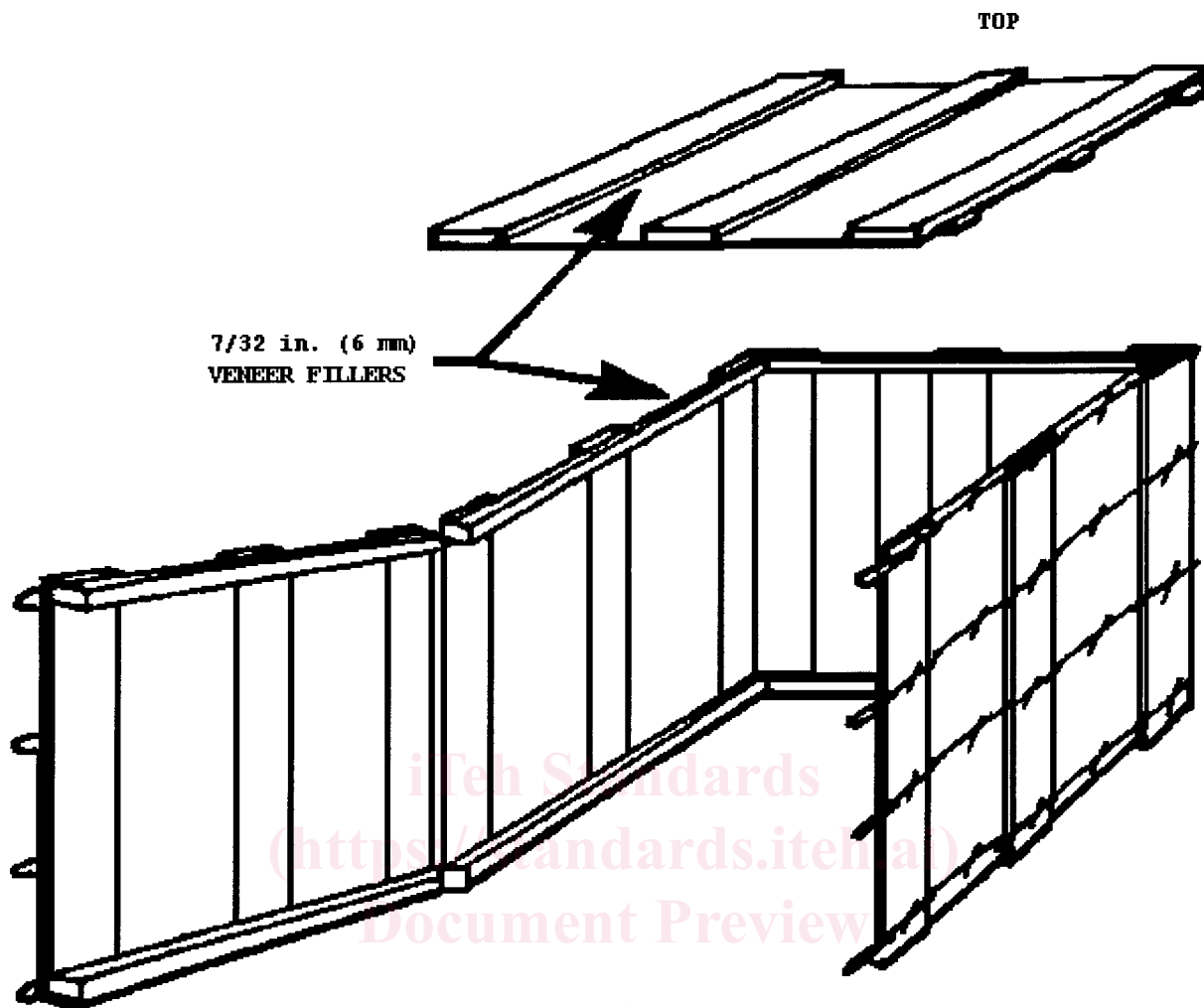
5.1.8 Whether additional markings are required (see 9.2).

5.1.9 Whether different strapping materials are required (see S3.2.1).

5.1.10 Whether additional support is required (see S3.2.3).



NOTE 1—All cleats (see Fig. 5 and Fig. 7), 13/16 by 7/8 in. nominal [16 by 16 mm]. Type I wirebound box (Select Class 1 or 2 base from Fig. 5).
FIG. 1 Type I Wirebound Box (Select Class 1 or 2 Base from Fig. 5)



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<https://standards.iteh.ai/catalog/standards/sist/451-b308-d9e78658e0e6/astm-d6254-d6254m-99> WIREBOUND BLANK

NOTE 1—Top battens (see Fig. 1 and Fig. 7) $\frac{7}{8}$ by $1\frac{3}{8}$ in. nominal [16 by 29 mm].
All cleats (see Fig. 5 and Fig. 7) $1\frac{3}{16}$ by $\frac{7}{8}$ in. nominal [16 by 16 mm].

FIG. 2 Type II Wirebound Box (Select Class 1 or 2 Base from Fig. 5).

5.1.11 Whether other construction methods or techniques are acceptable and permitted (see 1.3).

5.1.11.1 Whether proof that other constructions methods or techniques are acceptable (see 1.3) is required.

6. Materials and Manufacture

6.1 *Materials*—It is encouraged that recycled material be used when practical. All recovered, recycled, or virgin materials used in box manufacture shall meet the requirements of this specification and referenced documents. In addition, materials shall not affect or be affected by the product being packed.

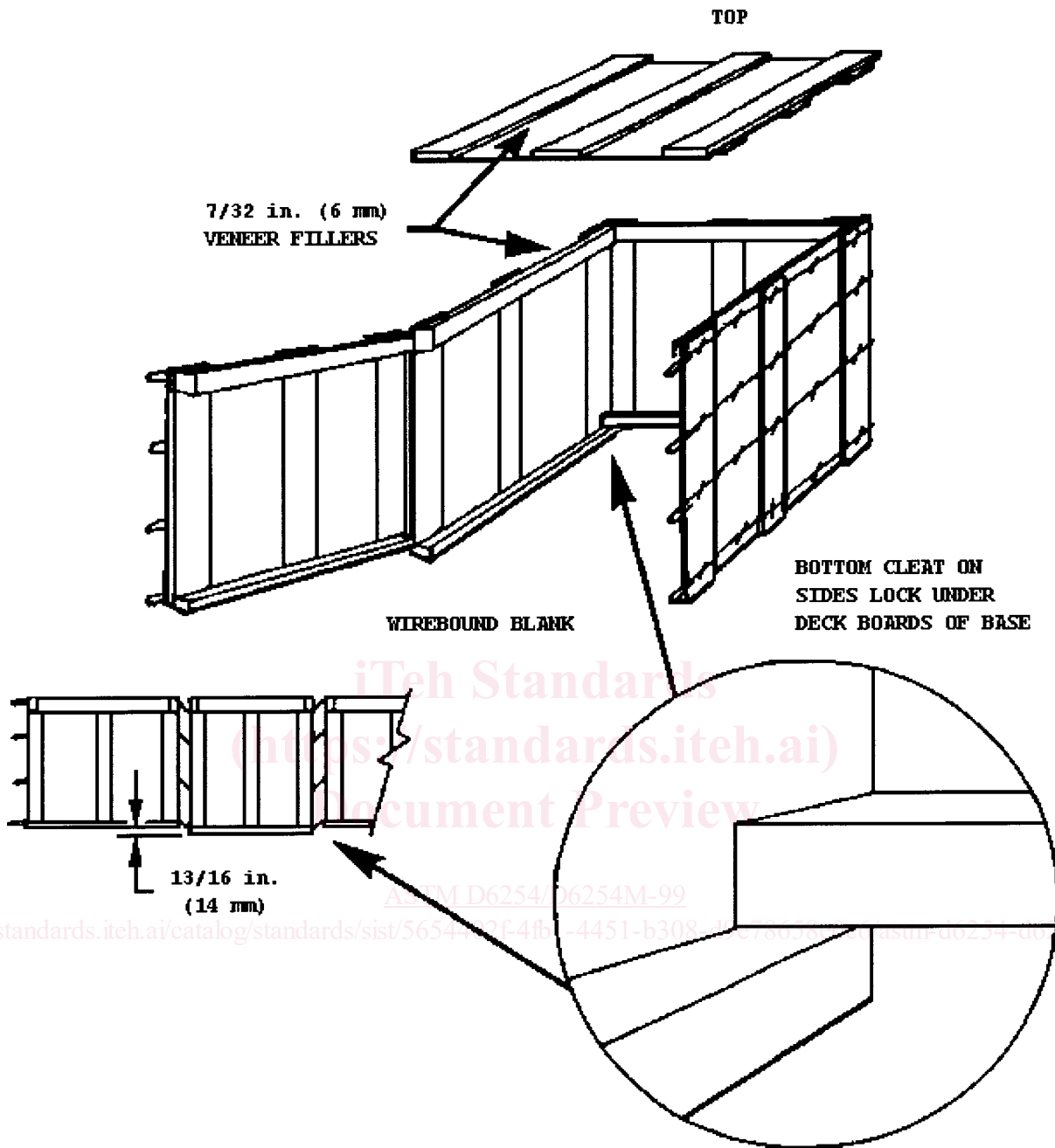
6.1.1 *Wood*—Wood used in box fabrication shall conform to Practice D 6199 as applicable and shall conform to commercial standards in accordance with Practice D 1990. Group I Woods shall not be permitted for cleats. Nominal dimensions shall be as specified in Practice D 6199.

6.1.1.1 *Wood Quality*—Grain divergence (grain slope), whether on a wooden member face or edge, shall not exceed 1

in. [25 mm] per 10-in. [254-mm] length for pallet base and box frame members and shall not exceed 1 in. [25 mm] per 8-in. [203-mm] length for face boards. Members shall be free from decay and sufficiently smooth on the exterior surface to permit legible markings. Stains and discoloration not associated with decay will be permitted provided they are not so pronounced as to obscure markings. Members shall be free from all defects that will interfere with specified stapling and nailing. Each wood member shall be a single wood piece without any joints.

6.1.1.2 *Cleat and Batten Knots*—Any cleat or batten knot width shall not exceed $\frac{1}{4}$ the member width. Knots shall be sound and tight with no part within $1\frac{1}{4}$ in. [32 mm] of the cleat or batten end. Loose knots and knot holes shall not be permitted in cleats and battens.

6.1.1.3 *Face and Deck Board and Stringer Knots*—Any face and deck board and stringer knot width shall not exceed $1\frac{1}{2}$ in. [38 mm] nor $\frac{1}{3}$ the member width. Knots shall be sound and tight with no part of any knot within 1 in. [25 mm] of the



NOTE 1—Top cleat $1\frac{3}{16}$ by $1\frac{5}{8}$ in. nominal [16 by 35 mm].
 Bottom cleat $1\frac{3}{16}$ by $\frac{7}{8}$ in. nominal [16 by 16 mm].
 Top battens $\frac{7}{8}$ by $1\frac{3}{8}$ in. nominal [16 by 29 mm].

FIG. 3 Type III Wirebound Box (Select Class 3 or 4 Base from Fig. 6)

member end. Loose knots or knot holes not more than 1 in. [25 mm] wide shall be permitted, provided they are not within 1 in. [25 mm] of the member end.

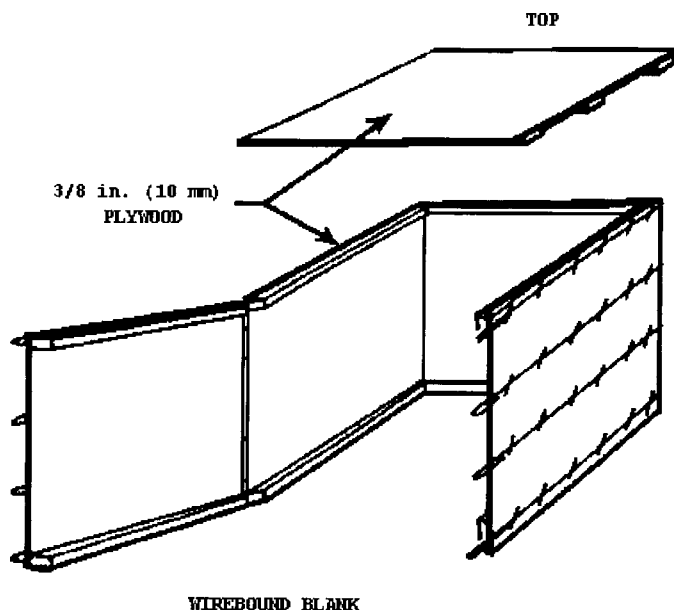
6.1.1.4 *Splits Extending Entire Board Length*—Splits extending the entire board length shall be permitted for sides, top, bottom, and ends, provided the width of the narrowest piece of the board measured from the split is $1\frac{1}{2}$ in. [38 mm] or greater, and a staple holds each piece end in place.

6.1.1.5 *Splits Diverging to Board Edge*—Splits diverging to an outer box edge shall not be permitted. Splits extending less

than the entire board length and not diverging to a board edge shall be permitted for sides, top, bottom and ends, provided that if the split were extended, the resulting boards would comply with the minimum requirements of 6.1.1.4.

6.1.1.6 *Splits Extending Through Staple or Nail Holes*—Board-end slits, caused by a fastener, which are not longer than 3 in. [76 mm], are acceptable provided the split does not terminate in the board edge.

6.1.1.7 *Wane or Bark*—Wane along any one wood member edge will be permitted for the full length of the member



NOTE 1—Top battens (see Fig. 1 and Fig. 7) 7/8 by 1 3/8 in. nominal [16 by 29 mm].
 All cleats (see Fig. 5 and Fig. 7) 1/4 by 7/8 in. nominal [16 by 16 mm]
FIG. 4 Type IV Wirebound Box (Select Class 1 or 2 Base from Fig. 5)

provided it does not exceed 3/8 in. [10 mm] in either direction from the member edge. Bark shall not be permitted on any wood component.

6.1.1.8 *Moisture Content*—At the time of box fabrication, wood member moisture content shall be in accordance with Practice D 6199 except that there shall be no restriction on pallet base stringer's moisture content.

6.1.1.9 *Preservation Treatment*—When Treatment A or B is specified, pallet finished parts or complete pallet boxes shall be immersed or flooded completely so as to cover all interior and exterior surfaces for the time period specified. Treatment A shall utilize TT-W-572, Composition C or D preservative, or a commercial equivalent, for a minimum of 3 min. Treatment B shall utilize either a 2 % copper naphthenate, a 3 % zinc naphthenate, or a 1.8 % oxine copper, formerly referred to as copper-8-quinolinolate, solution for a minimum of 1 min.

6.1.2 *Plywood*—Type IV boxes shall use plywood conforming to ANSI/HPVA HP-1-1994, Type I, Grade 3-4; APA PS1-95, Interior with Exterior Glue; or APA PS1-95, Exterior, Grade C-C. Plywood shall have no defects (knot holes, worm holes, and so forth) extending through the panel. Unless otherwise specified, plywood shall be finished unsanded.

6.1.3 *Binding Wire*—Binding wire shall be as a minimum, 13-gage, 0.0915-in. [2.324 mm] diameter, low carbon, annealed steel wire. The wire's physical properties shall permit satisfactory forming of the loop closures without fracturing the wire. The wire tensile strength shall be from 60 000 to 85 000-lb/in.² [413 685 to 586 054 kPa].

6.1.3.1 *Coating*—The binding wire surface shall be galvanized. The galvanized coating shall be smooth and shall not flake nor peel when the wire is wound around a 3/16-in. [5-mm] diameter mandrel (see 8.2).

6.1.4 *Staples*—Staples shall be made from low carbon steel wire. The wire tensile strength shall be from 95 000 to 125 000

lb/in.² [655 002 to 861 844 kPa]. Staples shall be in accordance with Specification F 1667, Type IV, Style 3.

6.1.4.1 *Coating*—The staple wire surface shall be galvanized. The galvanized coating shall be smooth and shall not flake nor peel when the wire is wound around a 3/16-in. [5-mm] diameter mandrel (see 8.2).

6.1.5 *Nails*—Nails shall conform to Specification F 1667. Pallet nails shall be in accordance with Specification F 1667, Type I, Style 18.

7. Construction

7.1 *Type and Class*—A partial four-way or two-way entry base may be used with each box type as specified (see Section 5).

7.1.1 *Type I Boxes*—Type I boxes shall conform to Fig. 1. Type I boxes shall be limited to a 48-in. [1219-mm] maximum inside depth (load height). The inside length or width shall not exceed 60 in. [1524 mm], and when added together, shall not exceed 102 in. [2591 mm]. Bases shall conform to Fig. 5.

7.1.2 *Type II Boxes*—Type II boxes shall conform to Fig. 2. Type II boxes shall be limited to a 40-in. [1016-mm] maximum inside depth (load height). The inside length and width dimensions, when added together, shall not exceed 96 in. [2438 mm]. Bases shall conform to Fig. 5.

7.1.3 *Type III Boxes*—Type III boxes shall conform to Fig. 3 and to the dimensional limitations of 7.1.2. Bases shall conform to Fig. 6.

7.1.4 *Type IV Boxes*—Type IV boxes shall conform to Fig. 4. Type IV boxes shall be limited to a 48-in. [1219-mm] maximum inside depth (load height). The inside length shall not exceed 96 in. [2438 mm]. The inside width shall not exceed 48 in. [1219 mm]. The inside length and width dimensions, when added together, shall not exceed 128 in. [3251 mm]. Bases shall conform to Fig. 5.

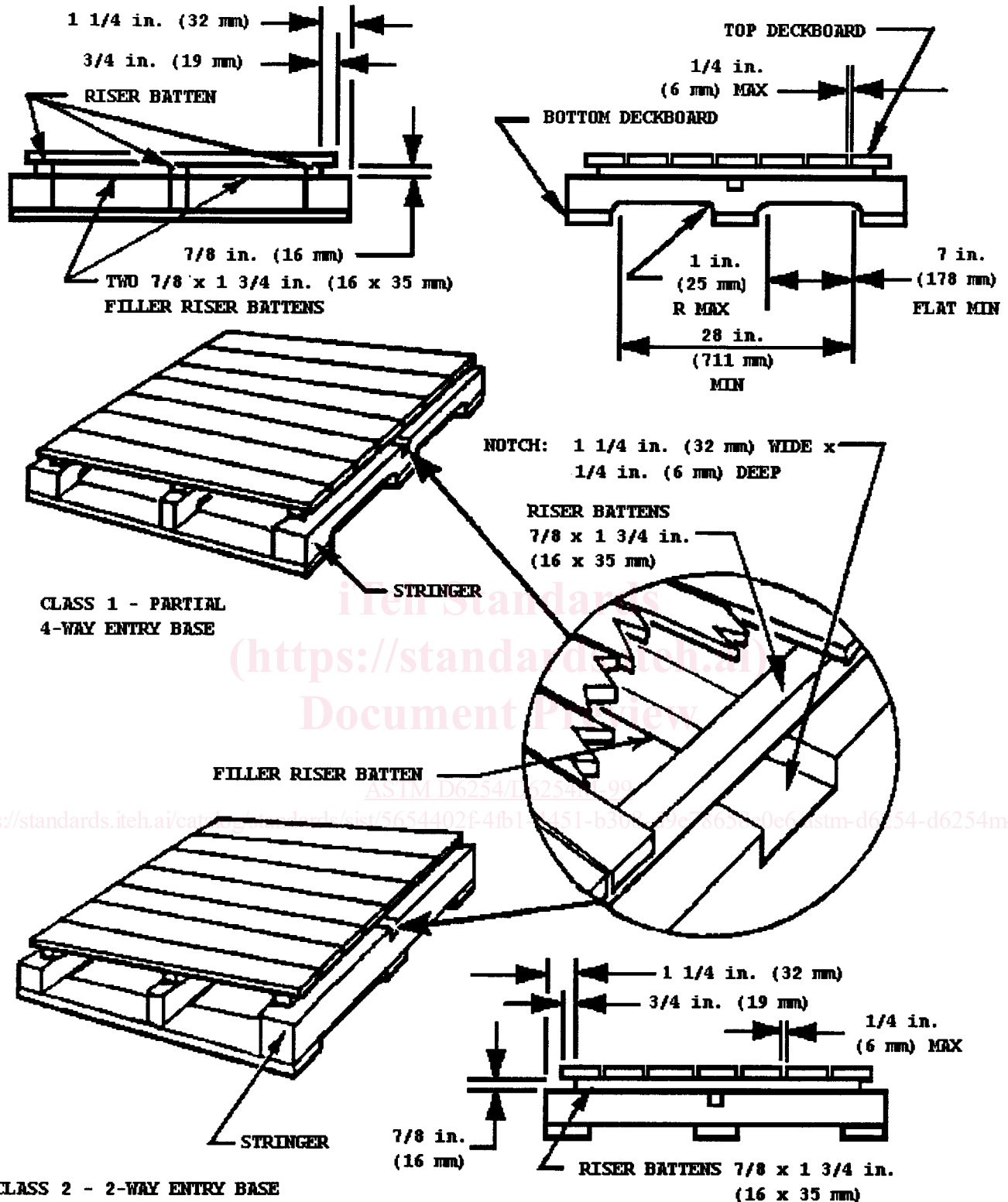


FIG. 5 Class 2—Pallet Bases (for Types I, II, and IV Boxes)

7.2 Wirebound Blank:

7.2.1 Cleats—Cleats shall be made of Group II, III, or IV woods (see 6.1.1). All cleat ends, except the bottom cleats for Type III boxes, shall be mitered. The bottom cleats for Type III boxes shall be butt-end. The width and thickness cleat dimen-

sions shall be as shown on the applicable figure with a $\pm 1/32$ -in. [1-mm] width dimensional tolerance. The minimum thickness shall be 7/8 in. [16 mm].

7.2.2 Face Boards—Face boards shall be made from any of the wood species permitted in Practice D 6199. Face boards,